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Systematic review

Health information exchange as a complex and adaptive construct: scoping review

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ABSTRACT

Objective To understand how the concept of Health Information Exchange (HIE) has evolved over time.

Methods Supplementary analysis of data from a systematic scoping review of definitions of HIE from 1900 to 2014, involving temporal analysis of underpinning themes.

Results The search identified 268 unique definitions of HIE dating from 1957 onwards: 103 in scientific databases and 165 in Google. These contained consistent themes, representing the core concept of exchanging health information electronically, as well as fluid themes, reflecting the evolving policy, business, and organisational and technological context of HIE (including the emergence of HIE as an organisational ‘entity’). These are summarised graphically to show how the concept has evolved around the world with the passage of time. The term HIE emerged in 1957 with the establishment of occupational HIE, evolving through the 1990s with concepts such as electronic data interchange and mobile computing technology; then from 2006 to 2010, it largely aligned with the US government’s health information technology strategy and the creation of HIEs as organisational entities, alongside the broader interoperability imperative, and continues to evolve today as part of a broader international agenda for sustainable, information-driven health systems.

Conclusions The concept of HIE is an evolving and adaptive one, reflecting the ongoing quest for integrated and interoperable information to improve the efficiency and effectiveness of health systems in a changing technological and policy environment.

Keywords: health information exchange, definition, scoping review, eHealth

INTRODUCTION

Polymakers, health care professionals, industry groups and researchers recognise health information exchange (HIE) as a vital component of the solution to the current problems posed by disparate and fragmented health systems and non-interoperable technologies.^{1,2}

HIE is not a new concept, but an evolving one, which to some extent 'reinvents itself' every 2.5 years due to the advancement in technology and changing of the regulatory environment.^{3,4}

The report 'Evolution of State Health Information Exchange' prepared for The Agency for Healthcare Research and Quality yielded many significant findings about various HIE projects in terms of their designs and goals, stages of development and specific future barriers to deployment.³ The authors noted that no two HIE projects were similar, as the projects differ vastly with regard to stakeholders engaged, available finance, choice of technology, deployment strategy and community background.³ This variability makes it difficult to track the development of HIE due to variability of the HIE definitions and HIE models deployed.⁴ As described elsewhere in this issue (see Part 1 of the review), we undertook a detailed scoping review of existing definitions of HIE in order to develop an evidence-based concept map that may be helpful for HIE stakeholders and for improving clarity and comparability in the published literature. This paper describes the components of the analysis oriented around time to assess and map the evolution of HIE concepts.

METHODS

In this part of the review, the included definitions were thematically analysed to understand changing concepts and perspectives of HIE over time and in different global regions. First, definitions were sorted according to the year of publication. Second, definitions were thematically analysed according to their changing contexts with the passage of time.

RESULTS

Corpus of Definitions

As noted in our Part 1 of the scoping review paper, the 268 unique definitions eligible for inclusion dated back to 1957.⁵ Many definitions used terms synonymous with, or closely equivalent to, HIE, such as 'Electronic Data Interchange',⁶⁻⁸ 'Clinical Information Exchange',⁹⁻¹⁴ 'Healthcare Information Exchange',¹⁵⁻²⁰ 'Clinical Health Information Exchange',^{21,22} 'Clinical Document Exchange',²³ 'Medical Data Exchange',²⁴ and 'Information Exchange'.²⁵ Most of the definitions ($n = 240$) were from the United States. Other contributing countries were the United Kingdom (UK) ($n = 5$),^{10,26-29} Australia ($n = 3$),^{8,30,31} the Netherlands ($n = 3$),^{7,32,33} Canada ($n = 2$),^{34,35} Germany ($n = 1$),¹⁹ Denmark ($n = 1$),³⁶ New Zealand ($n = 1$),³⁷ Sweden/Finland ($n = 1$),³⁸ Israel ($n = 1$),³⁹ Switzerland ($n = 1$),⁴⁰

Portugal ($n = 1$)⁴¹ and the European Union ($n = 1$).⁴² The origins of seven definitions were unclear.

Changing definitions over time and different national perspectives

Figure 1 illustrates a timeline of the included definitions. The concept of HIE evolved with the rise in occupational health problems in the United States when Byers in 1957 recognised the need for a central coordinating organisation. Early 'occupational HIE' aimed to collect, collate and disseminate all types of information related to occupational health problems.⁴³ In the early 1990s, references to Electronic Data Interchange (EDI) systems for transferring data between General Practitioners (GPs), hospitals and various other stakeholders to enhance quality of care appeared in the literature from Australia (1991),⁸ the Netherlands (1992)⁷ and the United States (1998).⁶ In 1996, the term mobile computing technology (MCT) began to be used in the United States to describe clinical information exchange between older cardiac surgery patients at home and health care providers to give additional information of patients' recovery to providers after surgery.⁴⁴

Varying conceptual starting points: In 2006, a report from Australia defined HIE as the corporate network of data warehouses of the health department that contains data on surgical procedures, international classification of diseases, diagnostic codes, record episodes, information and diagnoses and some demographic items.³⁰ Again in 2006, the first definition from the UK defined HIE as a process in terms of 'information exchange' between patients and health professional to achieve shared decision making.²⁶

HIE as an organisational entity. Between 2006 and 2007, the terms HIEs and regional health information organisations (RHIOs) were being used interchangeably in the United States to facilitate the flow of clinical information^{45,46} in parallel with the concept of linking patients' health records across organisations,⁴⁷ including medical records,²⁰ provider health records⁴⁸ and HER.⁴⁹ Between 2008 and 2009, the concept of an HIE as an organisational entity was becoming common in the United States, using location-specific names such as local health information organisations (LHIOs), RHIO and sub-network organisations (SNO) and 'state-wide', all serving the purpose of overseeing and governing the exchange of health information among different health care stakeholders.⁵⁰

Funding environment: The funding environment for enabling and sustaining HIE is emphasised in a number of definitions. In 2007, a US definition described HIE as a 'multi-million dollar effort' and insisted on establishing a reason to sustain the effort (HIE).⁵¹ In the same year, the business case for investment in HIE was argued in terms of its potential to create productive efficiencies for the provider community.⁴⁵ Another US definition from 2009 defined it as 'a business offering services to generate revenue that must exceed its expenses and should provide services according to the expectations of stakeholders'.⁵²

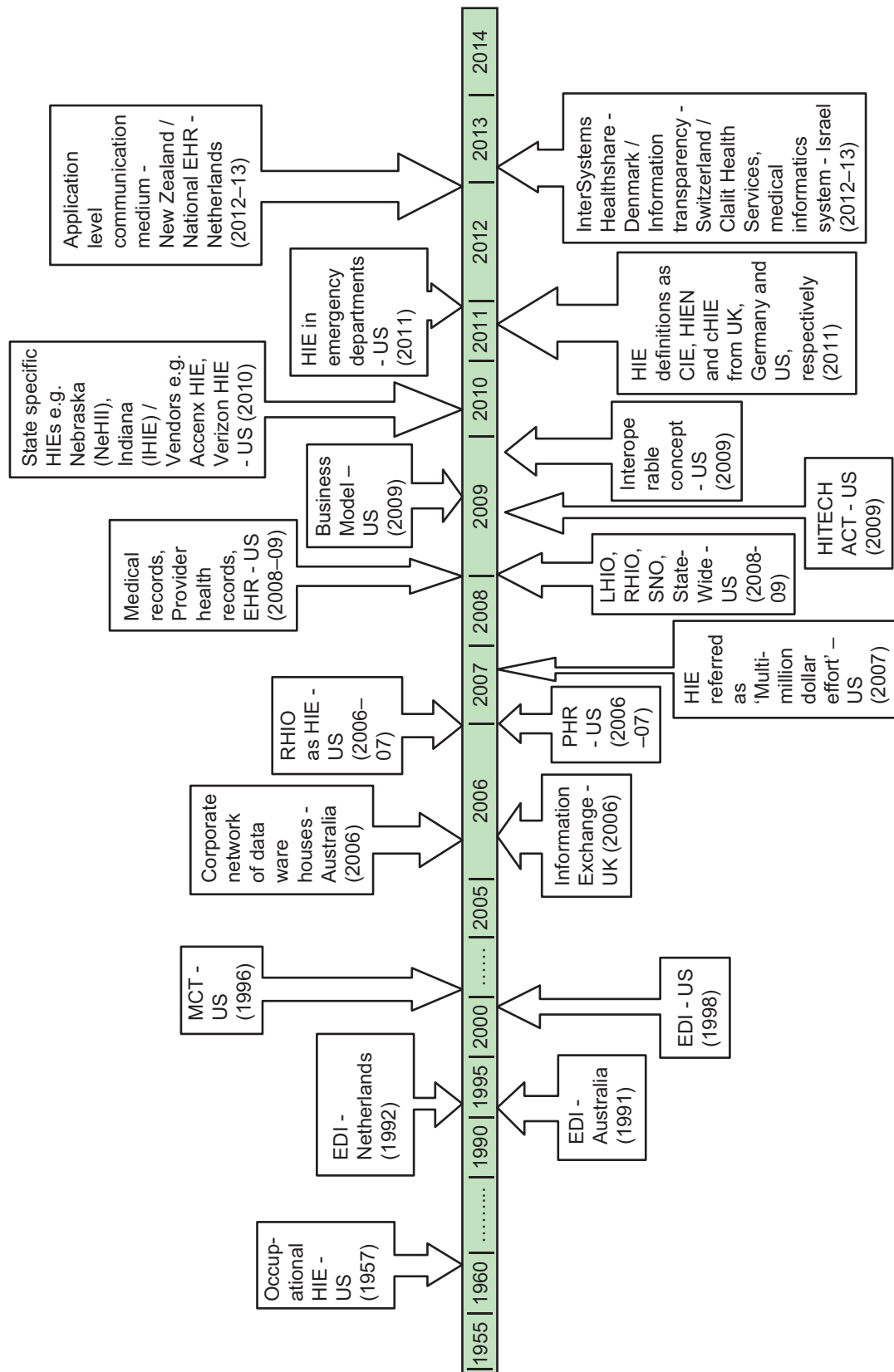


Figure 1. Changing definitions over time and different national perspectives

Interoperability agenda. References to the term 'interoperability' became more common in 2009⁵³ in a US definition of HIE along with the term 'standardised electronic exchange', recognising the need to manage incompatibilities between systems and software.⁵⁴

Influence of the US policy/incentives environment: 48 definitions appeared during 2009–2010, all from the United States, with the exception of two from Canada, illustrating the increasing importance of HIE in North America for the two consecutive years after the enactment of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009 and the associated attention from researchers, academicians and vendors in United States. Along with the general definitions of HIE, a number of HIE definitions are specifically associated with certain states' and vendors' names, for example, Nebraska Health Information Initiative (NeHII),⁵⁵ Indiana HIE (IHIE),⁵⁶ South Carolina HIE (SCHIE),⁵⁷ and New York Clinical Information Exchange (NYCLIX),¹² whereas vendors involved were Accenx Exchange,⁵⁸ Centricity HIE⁵⁹ and Verizon HIE.⁶⁰

Global dispersion of the concept: By 2011, the concept of HIE dispersed to the other parts of the world and the literature included definitions from Germany, UK and Finland/Sweden. We see slight modifications of the term HIE such as Healthcare Information Exchange Network in a definition from Germany,¹⁹ Clinical Information Exchange in definitions from the UK¹⁰ and United States¹² and Clinical HIE in a definition from the United States.²² A definition from the UK stressed the accomplishment of HIE through policy, infrastructure and system of care. Moreover, it further says to acquire and build computing applications and make use of financial and clinical incentives to sustain clinical information exchange. Several definitions dating from 2011 focused on the use of HIE in emergency departments, for supporting access to patient records for the purposes of out-of-hours medical care.

As the topic of HIE gained momentum, more countries, states and vendors came out with definitions in 2012–2013. New Zealand referred to it as an 'application-level communication medium' to exchange health information.³⁷ Denmark, a global leader in software for connected care, has aligned the concept of HIE very much with the vendor system procured for national use, InterSystems HealthShare™.³⁶ A definition from the Netherlands referred to HIE as national Electronic Health Records (EHR)³² while a definition from UK referred to it as 'nationally accessible electronic records'.⁶¹ A definition from Switzerland aligns the concept of HIE with the benefits and challenges it generates, such as greater care coordination through transparency, balanced by risks of greater disclosure and the need to change the habits and practices of patients and health professionals.⁶² Finally, a definition from Israel identifies 'Clalit Health Services' as an HIE entity, which uses a single medical informatics system to exchange health information between a national network of hospitals and community care.³⁹

DISCUSSION

The analysis has revealed the emerging nature of the field and the changing relevance of HIE to different stakeholders and contexts.

The majority of the definitions originated in the United States, no doubt reflecting the considerable investments in HIE that have characterised the government's HITECH Act,^{63,64} which aims to accelerate the adoption of interoperable health information systems and integrate the health care delivery systems for the benefit of patients. This has fuelled a growth in interest in HIE amongst health care professionals, providers, payers, technology companies, policy makers and researchers.

With respect to international variations, the related terms, HIE, Clinical Information Exchange, Healthcare Information Exchange, EDI and Clinical Health Information Exchange were used mostly in the United States, whereas in the UK only HIE and Clinical Information Exchange terms were typically used when referring to the exchange of health information. HIE and EDI were preferred in publications emanating from the Netherlands, and our review found one definition on Healthcare Information Exchange Network from Germany.¹⁹

Although the term EDI was used more in the contexts of exchanging business information using a standard format, our review found two definitions of EDI, dating back to 1992⁷ and 1998,⁶ that fit our inclusion criteria as describing HIE.

Organisations exchanging health information were also known by different names, such as LHIO, RHIO and SNO.⁵⁰ In some cases, the terms HIE and RHIO were used interchangeably^{13,34,45,65,66} although RHIO typically referred to an infrastructure that enabled HIE within the health care administrative regions.^{39,67}

The origins of various definitions lie in a range of contexts, reflecting the importance of HIE for various purposes across the health industry, for example, occupational health HIE, community HIE and HIE for public health. Most of the definitions prioritise regional or national perspectives, although a few make reference to the value of HIE on a global level.^{55,68,69} At the macro level, natural disasters and viral outbreaks present requirements for global monitoring or coordinated international responses, for which effective HIE is essential. For example, this was demonstrated in the aftermath of Hurricane Katrina, where health care organisations throughout the region and nationwide exchanged health information in order to take care of inhabitants displaced by the storm.⁷⁰ The value of HIE in managing the recent Ebola crisis has also been described.⁷¹

Strengths and limitations

Strengths of the review include searching from 1900 to 2014, analysing a large corpus of HIE definitions and using academic databases and grey literature to find HIE definitions. Moreover, including reference of each source document and the given appendix (see Appendix A) ensured rigour of the findings.

However, we recognise the considerable progress that many countries across Europe, New Zealand, Australia, Israel and elsewhere have made in implementing national and regional health information infrastructures to support HIE, which are not fully reflected in the corpus of HIE definitions. Extending the search to related terms such as 'national health information infrastructure' would no doubt uncover additional definitions, and authors in the future may wish to extend the review to capture broader aspects of health informatics.

Implications for research, practice and policy

Governments become more attuned to what other countries are doing, and with major eHealth technology businesses globalising, we might expect the language of HIE to coalesce around a set of concepts. The priority according to different issues within HIE discussions may also change as more countries become involved in HIE; for example, personal health insurance and reimbursement are major issues in the United States, but in the UK and some other countries, health care is free to citizens at the point of care and funded through national taxation.

Although HIE is still in infancy, it has been on a promising track due to evolving technology and growing models

of value-based payment which propose the design and functions of HIE initiatives.⁷² Apart from improved care and coordination, further research is required to explore the new evolving functionalities of HIE such as the availability of clinical data for public health surveillance and constructing longitudinal consumer-accessible personal health records.⁷²

CONCLUSIONS

HIE remains an evolving concept, which due to its complexity presents challenges for developing concrete and shared definitions. It will continue to evolve mainly due to change in technology, stakeholders engaged and different paradigms of health care in different countries. In addition, the growing health care challenges around the world, such as Zika, will trigger further research to develop effective HIEs with new designs and services.

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Appendix A: Extracted Definitions

S.No.	Author	Source	Year of Publication	Country	Definition
1.	1 st PC (73)	Web page: 1 st Providers Choice, Solution Provider	Unknown	US	Health Information Exchange (HIE) refers to the process of reliable and interoperable electronic health-related information sharing conducted in a manner that protects the confidentiality, privacy, and security of the information.
2.	4Med (74)	Web page: Educational Resource for Healthcare Information Technology	Unknown	US	Health Information Exchange (HIE) represents the transmission of healthcare-related data among facilities, health information organizations (HIO) and government agencies according to national standards. HIE is an integral component of the health information technology (HIT) infrastructure under development in the United States and the associated National Health Information Network (NHIN).
3.	Abhyankar et al (75)	Scientific	2010	US	Some regional health information exchanges (HIEs) provide web-based delivery systems that accept lab results messages from many sources (e.g. hospital laboratory, stand-alone radiology services) and deliver them in a uniform format to physician offices.
4.	Accenx (58)	Web page: Healthcare information technology & IT strategy news	2009	US	The Accenx Exchange is a health information exchange (HIE) services platform that brings the medical records in any given community much closer together by actually extending the reach out to the physician practices, hospitals and other healthcare organizations. It allows public or private HIEs to immediately establish a technology and service platform for sharing clinical results, orders and other patient information among providers using virtually any EMR system - or no EMR at all.
5.	Adler-Milstein et al (76)	Scientific	2011	US	Central goal of the legislation was to promote broad-based electronic HIE, in which key clinical data flow among providers and between providers and other stakeholders, such as public health departments.
6.	Adler-Milstein et al (77)	Scientific	2011	US	Health information exchange enables patients' health information to follow them between delivery settings in order to support care coordination and avoid duplication of services. There is broad consensus that such connectivity is critical to improving care and reducing healthcare costs.
7.	Adler-Milstein and Jha (78)	Scientific	2012	US	Health information exchange (HIE) is the act of sharing clinical data among health care practitioners and practice settings (physicians, hospitals, nursing homes, etc) who are not part of the same organizational entity.
8.	Adler-Milstein et	Scientific	2013	US	Health information exchange (HIE) refers to the process of electronically

S.No.	Author	Source	Year of Publication	Country	Definition
	al (79)				transferring, or aggregating and enabling access to, patient health information and data across provider organizations. Exchange may take place between different types of entities, for example, e-transfer of patient data between ambulatory care providers or e-transfer of data at the regional level.
9.	AeHN (80)	Web page: Alaska eHealth Network	Unknown	US	Health information exchange (HIE) is the electronic sharing of health-related information.
10.	Afzal (81)	Conference: Maryland's Health Information Exchange. SOA in Healthcare Conference. The Role of Health Information Exchange in Driving Toward Interoperability	2011	US	Health Information Exchange, or HIE, allows clinical information to move electronically among disparate health information systems. The goal of HIE is to deliver the right health information to the right place at the right time—providing safer, more timely, efficient, equitable, patient-centered care.
11.	AHA (82)	Report: Health Information Exchange Projects What Hospitals and Health Systems Need to Know by American Health Association	Unknown	US	Health information exchange enables hospitals to bring better information to the point-of-care and enhances opportunities for clinical decision support.
12.	AHIMA (83)	Web Page: American Health Information Management Association	Unknown	US	An HIE is the electronic movement of health-related information among organizations according to nationally recognized standards. HIE is also sometimes referred to as a health information network (HIN)
13.	Alert (41)	Web page: Alert HIE, Provider		Portugal (Head Office)	ALERT® HIE is an integration infrastructure that provides the ability to access patient clinical records from different healthcare facilities located in different geographical areas.
14.	Altman et al (84)	Scientific	2012	US	HIE enables digital, clinical information sharing among disparate institutions, which allows for a more seamless transition of care between providers. With HIE, patients can have their existing clinical information viewed by providers across different healthcare organisations, keeping all of their providers informed. Using HIE, community clinicians can also follow their patients' interactions with participating hospitals in real time.

S.No.	Author	Source	Year of Publication	Country	Definition
15.	AMA (85)	Web page: American Medical Association	Unknown	US	Health Information Exchanges (HIEs) are entities that bring together health care stakeholders within a defined geographic area and govern the electronic sharing of health information among them for the purpose of improving health and care in that community. The fundamental concept behind creating HIEs is that the ability to exchange health information electronically is critical to the efforts to improve the US health care system.
16.	Amatayakul (50)	Web page: Healthcare Financial Management business journal	2008	US	HIE organizations go by different names-local health information organizations (LHIO), regional health information organizations (RHIO), sub-network organizations (SNO)--they serve the same purpose: to oversee and govern the exchange of health-related information among disparate stakeholders for the purpose of improving health and health care.
17.	Ancker et al (86)	Scientific	2012	US	Health information exchange (HIE), the exchange of electronic patient data among healthcare providers and institutions, is being promoted by national policy because of its potential to improve healthcare quality and efficiency, engage consumers, and promote population health.
18.	Arkansas OHIT (87)	Web page: Arkansas Office of Health Information Technology	Unknown	US	The Arkansas State Health Alliance for Records Exchange (SHARE) is a statewide health information exchange (HIE) that solves this problem. SHARE allows primary health care providers, related health services professionals, and public health authorities to access and exchange with each other real-time, electronic patient information that is secure and protected by current federal and state privacy and security laws. Through its implementation and use, SHARE will reduce medical errors and duplicate testing, promote improved management of chronic diseases, and improve patient care coordination among unaffiliated health care providers.
19.	Aspelin (88)	Web page / Post: Mark Aspelin, Health IT Manager / Writer	Unknown	US	Health Information Exchange (HIE) is a term that is used to describe the sharing of health information electronically among two or more entities. The term is also used to describe an organization that provides services that enable the electronic sharing of health information. The concept of a health information exchange is a critical element of Meaningful Use, and the future of healthcare reform at the local, regional, and national level.
20.	Axolotl Corp. (55)	Web page: Axolotl Corporation provider for browsing based-products	2009	US	NeHII is a statewide Health Information Exchange designed to share clinical and administrative data among providers in Nebraska and neighboring states. NeHII's purpose is to achieve health care transformation through community betterment collaboration while protecting the security and privacy of medical information.
21.	Barton et al (30)	Scientific	2006	Australia	The HIE is the department's corporate network of data warehouses. It contains

S.No.	Author	Source	Year of Publication	Country	Definition
					data on surgical procedures on inpatients and international classifications of diseases, 10th edition (ICD-10) diagnostic codes, and records episodes of care and contains information on diagnosis, procedures and some demographic items
22.	Birkle et al (19)	Scientific	2011	Germany	Healthcare Information Exchange Networks (HIEN) enables the exchange of medical information between different institutions.
23.	Bostick et al. (89)	Report: Sustaining Health Information Exchange: A State Toolkit by National Governors Association Center for Best Practices State Alliance for eHealth	2011	US	The term "health information exchange" (HIE) refers to the electronic movement of health-related information among organizations such as health care providers, public health agencies, and payers, according to nationally recognized standards.
24.	Bouhaddou et al (90)	Scientific	2012	US	Health information exchange (HIE) refers to the activity of secure health data exchange between two authorized and consenting trading partners. It is a secure data service that utilizes nationally recognized standards to enable electronic transport of clinical information among separate health care organizations that are motivated by common interests and governed by rules that ensure the rights of patients and participants are protected.
25.	Boyle (28)	White paper: Privacy Lessons Learned from an Operational Health Information Exchange by FairWarning	2011	UK	Health Information Exchanges (HIEs) which facilitate the electronic exchange of patient information between care providers at a provincial, state, regional or national level.
26.	Braithwaite (6)	Scientific	1998	US	Workgroup Electronic Data Interchange (WEDI), a coalition of representatives from various components of the health care industry, including insurance companies, managed care organizations, health care provider organizations, government agencies, and health care clearinghouses.
27.	Bredfeldt (91)	Scientific	2013	US	Electronic health information exchange (eHIE) facilitates coordination of care by enabling information transfer across providers and medical clinics. By increasing care coordination, eHIE is expected to reduce healthcare costs resulting from redundant lab tests and radiology studies.
28.	Bresnick (92)	Web page: ehrintelligence.com for	2013	Unknown	Health information exchange (HIE) makes many promises: a complete, structured, electronic patient record, available to any provider at the push of a

S.No.	Author	Source	Year of Publication	Country	Definition
		latest technology news and white papers / Article			button, instantly updated and always reliable.
29.	Bugge et al (26)	Scientific	2006	UK	Information exchange between patients and health professionals is fundamental to achieving patient participation in decision-making and shared decision-making is said to require the exchange of “all information relevant to decision-making”.
30.	Byers (5)	Scientific	1957	US	The Occupational Health Information Exchange will serve as a central agency for the collection, collation, and dissemination of all types of information pertinent to occupational health problems.
31.	Cannoy (20)	PhD Thesis: The Implications of HIE on Healthcare Consumers: The Case of Consumer Empowerment. Business Education Department, North Carolina A&T State University	2008	US	The capability to use technology to electronically exchange medical records is called Healthcare Information Exchange (HIE). HIE is the process of utilizing information systems and technology for electronic storage, retrieval, and sharing of healthcare information among participants in the healthcare system so that information is accessible at the point of care.
32.	Care Accord (93)	Web page: Oregon HIE	Unknown	US	Health information exchange (HIE) allows doctors, nurses, pharmacists and other health care providers to securely share a patient’s medical information electronically — reducing the need for patients to transport or relay their medical history, lab results, images or prescriptions between health care professionals. Instead, this information is shared between health care professionals before the patient arrives for an appointment or goes to the pharmacy. HIE can also reduce orders for duplicate procedures or tests because information is available where and when it is needed, as well as enabling smoother transitions of care because providers, hospitals and long term care facilities can more easily share information.
33.	Carter (94)	Scientific	2006	US	There are a multitude of terms currently used to describe a networked community of healthcare entities using interoperable electronic health record systems to exchange health information. These include regional health information organization (RHIO), health information exchange (HIE), the nationwide health information network, and at one time, community health information network.

S.No.	Author	Source	Year of Publication	Country	Definition
34.	CDC (95)	Presentation: Department of Health and Human Services, USA / Centre for Disease Control and Prevention Web page: eHealthserver News, GE Healthcare, a division of General Electric Company and global eHealth specialist InterComponentWare, Inc. (ICW) joint HIE	Unknown	US	HIE provides the capability to electronically move clinical information between disparate health care information systems while maintaining the meaning of the information being exchanged. The goal of HIE is to facilitate access to and retrieval of clinical data to provide safer, more timely, efficient, effective and equitable, patient-centered care.”
35.	Centricity (59)		2009	US	Centricity® Health Information Exchange services connects, stores and shares clinical data from hospitals, physician offices, pharmacies, labs and other sources to help improve communication flow between care providers and patients and clinicians. The resulting network enables state, government or healthcare delivery organizations to create a secure exchange to share patient conditions, allergies, medication history and other appropriate clinical data across the continuum of care.
36.	Cerner (96)	Web page: Cerner, Solution Provider	Unknown	US	Clinical Exchange Platform is a major Cerner Network offering that focuses on the secure exchange of critical patient summaries within the clinician’s workflow. Clinical Exchange Platform leverages a suite of open source solutions brought together by proprietary intellectual properties creating a low cost IHE Standards based exchange.
37.	Chaudhary (97)	Scientific	2012	US	Health Information Exchange (HIE) is the process of reliable and interoperable electronic health record (EHR) sharing, conducted in a manner that protects the confidentiality, privacy, and security of the information.
38.	Cisco (98)	Webpage: Cisco, Solution Provider	Unknown	US	The Cisco Medical Data Exchange Solution (MDES) is an integrated end-to-end, standards-based solution that facilitates patient-centric access to medical records. It gives healthcare professionals from multiple institutions access to patient data from previously disconnected systems with incompatible formats and disparate medical terminology. Now providers can quickly and easily access and review a patient’s medical data gathered by different applications and stored in separate locations.
39.	Citius Tech (99)	Web page: Technology and Solution Provider	Unknown	US	Health Information Exchanges (HIEs) offer significant opportunity for cross enterprise document sharing in healthcare – positively impacting both quality and cost of healthcare delivery. HIEs provide flexible data sharing capabilities with hospitals, public health and federal reporting entities. HIEs can also offer strong analytics and reporting capabilities to track population health and support a wide range of clinical decision support capabilities.

S.No.	Author	Source	Year of Publication	Country	Definition
40.	C. Kibbe (100)	Web page / Post: The Society for Participatory Medicine, e-patients.net	2009	US	Health information exchange between and among providers, especially when these providers are independent entities or exist in separate geographical locations, helps create continuity of patients' experience by providing continuity of information flow and access where once there were only isolated silos of health data. There is widespread belief that health data sharing could improve care, safety, and decrease waste and duplication.
41.	C. Livingood et al. (101)	Report: Public Health & Electronic Health Information Exchange: A Guide To Local Agency Leadership by The Institute for Public Health Informatics and Research Duval County Health Department	Unknown	US	The focus on electronic health information exchange (EHIE) emphasizes how data can best be shared and utilized across healthcare institutions and among providers to improve patients' health, improve the quality of care, increase efficiency, and reduce costs.
42.	Clemens (102)	Scientific	2012	US	Health information exchanges, in which all individual patient information is routinely and entirely managed through a central information system
43.	Clinical Connect (103)	Web page: Clinical Connect is a western Pennsylvania's first HIE	Unknown	US	ClinicalConnect is western Pennsylvania's first Health Information Exchange (HIE). A partnership of leading regional health care providers, ClinicalConnect will help to improve the safety, quality, and efficiency of care for patients throughout the region by securely connecting clinicians with patients' vital electronic medical records
44.	Codagnone (42)	A study prepared for the European Commission	2013	European Union	Health Information Exchange (HIE): is the process of electronically transferring / sharing / enabling access to patient health information and data.
45.	CORHIO (104)	Report: HIPPA and HIE by Colorado Regional Health Information Organization	Unknown	US	CORHIO's HIE makes it possible for providers to access and exchange patient information electronically, improving patient safety and reducing delays in care that can be caused when paper records are illegible, get lost, are accidentally destroyed by fire, flood or natural disaster, or are sent to the wrong fax machine or address. It also helps providers access more complete and up-to-date patient medical records, which is especially helpful in emergency situations or for patients who have a chronic medical condition for which they see many providers over the course of a year.
46.	CSC (31)	Web page: Healthcare Group / Service Provider	Unknown	Australia	CSC is taking a Health Information Exchange approach to enabling secure health data sharing between hospitals and other care providers. CSC's approach to Health Information Exchange (HIE) provides not only a

S.No.	Author	Source	Year of Publication	Country	Definition
					solution to enable the many and diverse CSC applications for the eHealth agenda but also an agnostic design that will allow our partners and competitors to leverage this platform.
47.	Daurio et al (105)	Scientific	2009	US	An exchange of clinical information between Brooklyn hospitals, nursing homes, and home health agencies that aids in the transition of care for its shared patients.
48.	Deas Jr and Solomon (106)	Scientific	2012	US	The term HIE is also used to describe formal organizations that provide the infrastructure for electronic exchange.
49.	De Brantes et al. (45)	Scientific	2007	US	Health information exchanges or regional health information organizations (HIEs or RHIOs) have emerged as vehicles to facilitate the flow of clinical information between providers in the community; they are building on the foundation laid by the pioneers in the field, the Indiana Health Information Exchange, the Inland Northwest Health System, HealthBridge and a few others. The primary business focus of these networks has sought to create value for the provider community by creating productive efficiencies. In doing so, they have been able to generate modest revenue, and therefore have achieved a modest but sustainable business model.
50.	Delfan (32)	Master Thesis: Computer Science Delft University of Technology	2013	Netherlands	Health Information Exchange (HIE) is a term used to describe the sharing of health information electronically among two or more entities. These entities are mostly organizations, which provide health services to their clients (the patients) and also enable the sharing of electronic health information. The exchange of medical data takes place primarily between different medical departments within the same health organization. This happens most of the time through an Electronic Health Records (EHR) system within the organization, but also across the organizational borders on the regional level (through Regional Health Information Systems, RHIS) or across the country (National EHR).
51.	Dimitropoulos and Rizk (53)	Scientific	2009	US	An interoperable system of HIE—that is, one in which various parties can share and exchange data among them.
52.	Dobbs et al (107)	Scientific	2010	US	HIEs would provide a unified view of a patient across health care providers and would serve as data collection points for clinical and resource utilization data.
53.	Downing et al (108)	Scientific	2010	US	Collaborative relationships among primary care and specialty providers and their patients and families can be enhanced through electronic HIE.
54.	Dullabh and Hovey (109)	Scientific	2012	US	There is widespread consensus that Health Information Exchange, the electronic sharing of patients' health information between delivery settings, is

S.No.	Author	Source	Year of Publication	Country	Definition
55.	eHealth Initiative (110)	Report: Health Information Exchange: From Start Up to Sustainability by Foundation for eHealth Initiative	2007	US	critical to improving the quality and efficiency of patient care. “Health information exchange” describes a commonly understood activity: the sharing of patient care data between non-aligned health care organizations for the purposes of enhancing quality and efficiency.
56.	eHealth Initiative (111)	2011 Report on Health Information Exchange: The Changing Landscape Web page: California Government	2011	US	The act of transferring health information electronically between two or more entities.
57.	eHealth Privacy 360 (112)	Web page: California Government	2011	US	The electronic exchange of health information allows your health care information to be shared between health care providers. This exchange is done through the EHR system. Your health information may be exchanged between doctors, laboratories, hospitals, pharmacies, and other providers you have visited. Health information from your health plan may also be exchanged and used for your care.
58.	Emdeon (113)	Web page: Vendor / Solution Provider	Unknown	US	Emdeon connects physicians, hospitals, pharmacies and labs to securely exchange information when it can save the most money and provide the most benefit - right at the point-of-care. Emdeon, currently performing more than 6.4 billion health information exchanges per year, makes the process of sharing information easy, efficient and affordable.
59.	Excellicare (29)	Web page: Axsys Health, Excellicare Solution Provider	Unknown	UK	Excellicare™ Clinical Portal allows users to explore information relevant to the care of every patient, regardless of where it was first recorded. As a care-giver, the portal offers you a composite view of patient information, in a clinically relevant format, with hyperlinks that let you drill to underlying details. Laboratory results and outstanding orders, recent medications and prescriptions, x-ray images and reports from radiology, coded problem list, clinical notes from any specialty – all these are presented in an easy-to-access, relevant way. But it doesn't have to stop there. Referral and discharge letters, GP notes, appointments, assessments, clinical alters, and information from community health can be included.
60.	Finn (114)	Scientific	2011	US	Health information exchange (HIE) is defined as the mobilization of health care information electronically across organizations within a region or community. It provides the capability to electronically move health information between various systems, while maintaining the authenticity and

S.No.	Author	Source	Year of Publication	Country	Definition
					accuracy of the information being exchanged. This sharing of critical and administrative health data electronically enables a care team to make more informed decisions. HIEs are multi-stakeholder organizations that oversee the business and legal issues involved in the exchange of information. The stakeholders are diverse and generally include large doctor groups, solo practices, competing hospitals, and payers. Patients have been visibly absent from the discussions, interactions, and agreements that form and run these HIE organizations. Patient access to their own information from an HIE has also been limited, but that promises to change over time.
61.	Florida HIE (115)	Web page: Florida HIE	Unknown	US	The Florida Health Information Exchange (HIE) provides entities with timely, secure, and authorized exchange of patient health information. The services we offer are based on national standards for secure exchange of health information.
62.	Florida HIN (116)	Web page: Florida Health Information Network	Unknown	US	The Florida Health Information Exchange (Florida HIE) enables the secure exchange of health information. It allows authorized medical providers to quickly and efficiently review their patients' medical records to facilitate diagnosis and treatment.
63.	Forcare (33)	Web page: Dutch software company providing software products and service for healthcare	Unknown	Netherlands	A Health Information Exchange is a network, allowing our customers to exchange medical data to support key clinical processes. Examples include imaging networks, referral networks and communication to GPs. An HIE can be built around a single hospital, or can cover a regional or national group of healthcare institutions.
64.	Frankel et al (39)	Scientific	2013	Israel	The vertically integrated Clalit Health Services seeks to completely open information exchange between hospital and community care by providing a single medical informatics system across the spectrum of care.
65.	Frisse (117)	Scientific	2010	US	This model — often called a health information exchange — differs from others in that the collection of health information exchange services commonly is managed through a designated legal entity, and data may be accessed from a highly secure set of services that provides the performance and simplicity of a centralized database.
66.	Frisse et al (118)	Scientific	2012	US	HIE is a set of services that supports access among parties who are motivated by common interest and governed to ensure that the rights of patients and participants are protected.
67.	Furukawa et al (119)	Scientific	2013	US	Electronic health information exchange can improve care coordination for patients by enabling more timely and complete sharing of clinical information among providers and hospitals.

S.No.	Author	Source	Year of Publication	Country	Definition
68.	GAO (120)	Report: Health Care Entities' Reported Disclosure Practices and Effects on Quality of Care by United States Government Accountability Office Washington, DC 20548	2010	US	Health information exchanges—entities that were formed to facilitate the electronic sharing of patients' health information among providers.
69.	Gadd et al. (121)	Scientific	2011	US	Its goal was to create an HIE that meets the basic needs of an underserved metropolitan region through exchange of clinical data among hospital emergency departments and community-based ambulatory clinics.
70.	Gaebel (122)	Web page / Post : HIMSS HIE Wiki	Unknown	US	A Health Information Exchange (HIE) assists with the transfer and sharing of health related information that is typically stored in multiple organizations, while maintaining the context and integrity of the information being exchanged. An HIE provides access and retrieval of patient information to authorized users in order to provide safe, efficient, effective, and timely patient care.
71.	Gartner (68)	IT Glossary: Gartner, Inc. Research and Advisory Company	Unknown	US	A health information exchange (HIE) is a regional collaboration among independent healthcare organizations for sharing clinical information. Often, administrative information is shared as well. HIEs may be categorized in terms of their approach to governance. In some countries, they may be run by a governmental agency. Other HIEs may be run by nonprofit corporations with a board of governors that represent community stakeholders. Still others are lines of business of for-profit vendors. A final form of HIE is funded and controlled by healthcare delivery organizations (HDOs) to meet their own business concerns, rather than being neutral to all community stakeholders.
72.	Gassett (44)	Scientific	1996	US	Mobile computing technology (MTC) could provide older cardiac surgery patients with a portable computer system to be used at home for accessing, collecting and transmitting clinical information related to their recovery.
73.	Geissbuhler (40)	Scientific	2013	Switzerland	The transparency resulting from a streamlined exchange of information may improve the continuity, quality and efficiency of care, while, at the same time, reveal and challenge habits and practices of care professionals and of citizens.
74.	Genes et al (123)	Scientific	2011	US	Health Information Exchange (HIE) has the potential to improve patient care by bringing relevant patient data to the point of care. HIE seems particularly promising in emergency departments (EDs), where patients frequently present

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					outside their usual medical home and outside the normal hours during which primary care doctors, pharmacies or insurers can typically be reached
75.	Georgia HIV HIE (124)	Web page: HIV HIE, Georgia Department of Public Health	Unknown	US	HIE proposes to develop and implement a system to alert healthcare providers of a patient's "out-of-care" care status so that they can re-engage them in HIV care. By improving linkage to and retention in care, and encouraging adherence to antiretroviral therapies, HIE will support clinical efforts to reduce viral loads and achieve an "undetectable viral load" or viral suppression.
76.	Grannis et al. (125)	Scientific	2010	US	HIEs standardize, aggregate and streamline information sharing among data partners, including public health stakeholders, and HIE has supported public health practice in Indiana for more than 10 years.
77.	Greenhalgh et al. (27)	Scientific	2013	UK	A nationally-accessible electronic record (known in the USA as health information exchange).
78.	Grinspan et al.(11)	Scientific	2013	US	NYCLIX (New York Clinical Information Exchange), a regional health information organization (RHIO) that draws clinical data from several New York City hospitals.
79.	Grossman et al. (126)	Scientific	2008	US	Local health information exchanges (HIEs) hold the promise of collecting patient clinical data across sites of care to provide more complete and timely information for treatment, as well as supporting quality improvement and reporting, public health activities, and clinical research
80.	Gulf Coast(127)	Web page: Gulf Coast HIE / Company	Unknown	US	Health Information Exchange (HIE) is the term used to describe large-scale electronic communication of patient information between unaffiliated healthcare providers.
81.	Haggstrom and Doebling (128)	Scientific	2011	US	Information exchange offers the potential to pool a single patient's data across multiple institutions; conversely, information exchange allows institutions to aggregate their own data across multiple patients. Patient-level aggregation offers the promise of improving clinical care across a fragmented health care delivery system, while institution level aggregation has the potential of serving as a data infrastructure for quality measurement.
82.	Halamka (129)	Scientific	2013	US	Intuitively, health information exchange should improve safety, quality, and efficiency by providing emergency department (ED) clinicians with accurate lifetime medical histories, up-to-date test results, and evidence of previous problematic therapies. However, studies demonstrating these benefits are few.
83.	Hall (130)	Electronic Article: Diagnostic Intelligence	2009	US	Broadly defined, a Health Information Exchange (HIE) exists whenever two or more organizations share healthcare related information electronically.

S.No.	Author	Source	Year of Publication	Country	Definition
		and Health IT Initiatives College of American Pathologists			Exchanging healthcare information between organizations improves patient care and reduces costs by fostering collaborative care and reducing administrative burden.
84.	Harris (131)	Web page: Harris Healthcare Solutions	Unknown	US	Harris enables IDNs, physician practices, medical groups and other care providers to exchange health information as never before, empowering provider collaboration - send and receive results and discharge summaries, exchange information on orders, engage in clinical messaging and share documents. Such data exchange is increasingly important as organizations respond to delivery-system reform by transitioning to new models such as becoming an Accountable Care Organization (ACO).
85.	Hasman et al. (7)	Scientific	1992	Netherlands	Electronic Data Interchange (EDI) is a reasonable substitute of the traditional mail for the communication between hospital and GP. It will lead to higher quality of data and to new applications that will enhance the quality of care.
86.	Hazamy et al. (14)	Scientific	2013	US	HEALTHeLINK, a clinical data exchange system to share patient information as a way to improve patient care.
87.	HC (132)	Web page: Greater Houston Health Connect, Greater Houston Health Information Exchange (GHIE)	Unknown	US	A health information exchange is a network of electronic health records designed to link all providers in a specific region. With this network, patient information moves electronically between physicians, hospitals, labs and pharmacies.
88.	Healthcare IT (133)(140)(140)(135)(192)	Web page: Healthcare IT News	Unknown	US	Health information exchange is the transmission of healthcare-related data among facilities, health information organizations and government agencies, according to national standards for interoperability, security and confidentiality. It is an important part of the health information technology (HIT) infrastructure under development in the U.S., and the associated National Health Information Network (NHIN).
89.	HealtheLink (9)	Web page: HealtheLink is a non-governmental, multi-stakeholder RHIO	Unknown	US	HEALTHeLINK, the Western New York Clinical Information Exchange, is collaboration among the region's hospitals, physicians, health plans and other health care providers to serve the eight counties of western New York State. HEALTHeLINK was created to enable the exchange of clinical information in secure and meaningful ways to improve both efficiency and quality, while also helping to control health care costs. Patients who provide consent allow physicians and providers directly involved in their treatment to securely access relevant medical information via HEALTHeLINK, resulting in more timely and effective treatment at the point of care.

S.No.	Author	Source	Year of Publication	Country	Definition
90.	Health Insights (134)	Report: Public Perception and Utah's Clinical Health Information Exchange, based on consumer focus groups conducted by Health Insights	2011-2012	US	One of the first state-run Health Information
91.	Health IT(135)	Web page: HealthIT.gov	Unknown	US	Health Information Exchange allows health care professionals and patients to appropriately access and securely shares a patient's vital medical information electronically. There are many health care delivery scenarios driving the technology behind the different forms of health information exchange available today.
92.	Health IT(135)	Web page: HealthIT.gov	Unknown	US	Electronic health information exchange (HIE) allows doctors, nurses, pharmacists, other health care providers and patients to appropriately access and securely share a patient's vital medical information electronically—improving the speed, quality, safety and cost of patient care.
93.	Health Leaders (136)	Web page: Health Leaders is a multi-platform media company to meet the information needs of health professionals	2009	US	The Exchange is an electronic health information system that will allow for the exchange of digital medical records between healthcare facilities, doctors' offices, and the Kentucky Department.
94.	Health Unity (137)	Web page: Vendor / solution Provider	Unknown	US	The HealthUnity HIE solution provides a one-stop solution for enabling seamless bidirectional communication between a wide array of entities including various types of providers, patients as well as public health. Services we provide include secure messaging, record location service, analytics service, results delivery service etc.
95.	Hersh (138)	Scientific	2009	US	Health information exchange (HIE), which is the exchange of health information for patient care across traditional business boundaries in health care
96.	Herwehe et al (139)	Scientific	2012	US	The Louisiana Public Health Information Exchange (LaPHIE) is a novel, secure bi-directional public health information exchange, linking state-wide public health surveillance data with electronic medical record data.
97.	HHS (140)	Report: National Biosurveillance Strategy for Human Health V2.0	2010	US	Electronic health information exchange is defined as the sharing of digitized human health data and information according to nationally recognized standards among organizations that can utilize the information to improve

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		by Centers for Disease Control and Prevention, US Dept. of Health and Human Services			individual and community health security.
98.	HIE Answers (141)	Web page: HIE Answers, Advancing Health Information / Online knowledge resource	Unknown	US	Health Information Exchanges are typically categorized by how a patient's health information is stored and how the legitimate members or participants can access patient health information.
99.	HIE Bridge (142)	Web page: A Minnesota certified HIE by a certified HIO	Unknown	US	HIE-Bridge™ is a Minnesota state certified health information exchange (HIE) allowing providers to locate and access key clinical information that is vital when making medical decisions. Through HIE-Bridge health providers have access to authorized patient information through a secure web-based information exchange platform.
100	HIECC (48)	Meeting: Meaningful Health Information Exchange by Health Information Exchange Coordinating Committee (HIECC) and State Electronic Prescribing Advisory Panel (SEPAP)	2009	US	“Meaningful health information exchange” refers to achieving a high level of participation in electronic health information exchange among hospitals, clinics, physicians, public health facilities, other health care providers, health plans and state agencies including data from health encounter claims, provider health records and state registries that has a measurable effect on community health care including improved efficiency of care (48)management processes, enhanced patient safety, increased effectiveness of care, and a measureable effect on population health including reduced disease incidence and prevalence.
101	HIE Nevada (143)	Web page: Health HIE Nevada, state-wide community HIE	Unknown	US	HealthHIE Nevada is the new state-wide community-based Health Information Exchange (HIE) that lets doctors' offices, hospitals, clinic, labs, pharmacies and other healthcare professionals easily access and share patient medical records quickly, securely and accurately at the point of care. The HIE helps Nevada health care providers improve the coordination and quality of patient care. Decisions can be made more quickly and with a greater understanding of patient history than ever before.
102	HIE Ohio (144)	Summary of Ohio Revised Code Chapter 3798	2012	US	Health Information Exchange is defined as “any person or governmental entity that provides in this state a technical infrastructure to connect computer systems or other electronic devices used by covered entities to facilitate the secure transmission of health information.”
103	HIMSS (145)	Report: Putting the HIE into Practice by HIMSS	Unknown	US	The electronic movement of health-related information among disparate organizations according to nationally recognized standards in an authorized

S.No.	Author	Source	Year of Publication	Country	Definition
104	HIMSS HIE Committee (146)	Report: HIE Implications in Meaningful Use Stage 1 Requirements, by HIMSS	2010	US	and secure manner. In its most conservative definition, HIE (the verb) is the activity of secure health data exchange between two authorized and consenting trading partners. Data exchange occurs between any two trading parties—a data supplier and a data receiver. It can also be facilitated by one, two or more third parties who operate between the data supplier and the data receiver. To add complexity, a third party could also be storing data from and on behalf of the data supplier and be transmitting data on behalf of the data supplier (in such case, the third party would be considered to be the data receiver). Further, a third party could be receiving data on behalf of a data receiver. While this may be complex, HIE activity can enhance virtually any clinical function by virtue of providing a broader set of data upon which clinical decisions can be based.
105	HINAz (147)	Web page: Health Information Network of Arizona	Unknown	US	A Health Information Exchange, such as HINAz, is a secure network that takes health care information from multiple health care organizations and sources and provides it to a patient's physician at the point of care when it is needed.
106	HINAz (148)	Web page: Health Information Network of Arizona	Unknown	US	A Health Information Exchange provides a network and universal format that connects hospitals, doctors and other providers. When needed, HIEs allow electronic health records, containing health-related information about a patient, to be securely shared among health care organizations.
107	Hincapie et al (149)	Scientific	2011	US	Health information exchange (HIE) is a potential solution to providing timely and effective clinical information at the point of care
108	HIS (150)	Web page: Indian Health Service for American Indians and Alaska Natives	Unknown	US	The goal of a Health Information Exchange (HIE) is to drive towards efficient exchange of patient data, so that a unified and holistic view of patient data is obtained. This, in turn, will enable physicians to offer better care for patients because providers of care will have a complete picture including all available medical records.
109	HISO (37)	Report: Health Information Exchange Architecture Building Blocks by National Health IT Board	2012	New Zealand	Application-level communication medium with standardised content and transport, across which participants exchange health information.
110	HITECH (49)	HITECH ACT	2009	US	A critical step toward realizing the full potential of electronic health records (EHRs) to improve the coordination, efficiency, and quality of care.
111	Hixny (151)	Webpage: Healthcaer Information Xchange of	Unknown	US	HIXNY (“hix-knee”), the Healthcare Information Xchange of New York, is a not-for-profit collaborative of health plans, hospitals, physician practices, and

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		New York, an InterSystems partner			other healthcare entities working together to enable secure access and electronic exchange of medical information to coordinate quality care, improve patient safety and reduce healthcare costs.
112	HRSA (152)	Web page: US Department of Health and Human Service, Health Resource and Service Administration	Unknown	US	Health information exchange (HIE) is the electronic of health-related information among organizations according to nationally recognized standards. The goal of health information exchange is to facilitate access to and retrieval of clinical data to provide safer, timelier, efficient, effective, equitable, patient-centered care.
113	Hripesak et al (2)	Scientific	2007	US	Health information exchange (HIE) projects—which are often run by regional health information organizations—may be a stepping stone to a fully interoperable health information infrastructure that improves the quality and efficiency of health care in the United States
114	HT (153)	White paper Health Texas Provide Network	Unknown	US	HIE stands for Health Information Exchange and is a term used to describe the sharing of health information through a secure electronic network that allows participating health care systems and providers to electronically share health information about their patients with each other, with other providers who have a treatment relationship with the patient, and for other healthcare operations related activities.
115	(23)	Web page: Solution Provider	Unknown	US	InterSystems Clinical Document Exchange allows your healthcare organization to send and receive the pertinent clinical, demographic, and administrative data in real time for a single patient in industry-standard documents, such as those listed in Consolidated Clinical Document Architecture (C-CDA) for Meaningful Use. This document exchange provides caregivers a more complete picture of patient health, leading to more informed treatment decisions and better coordination of care.
116	ICA (154)	Web page: Informatics Corporation of America, provides platforms and services	2012	US	AlliedHIE is a patient-centric, purpose-driven, point-of-care focused national health information exchange company with a mission to include allied health organizations in order to priority connect our most vulnerable and at-risk patients.
117	IHIE (52)	Report: Nationwide Health Information Network (NHIN) Trial Implementations presented to Office of the National Coordinator for Health Information	2009	US	HIE is a business and as with all businesses, creating a sustainable HIE requires offering services that the market wants at a price the market will bear and doing so in such a way that revenue exceeds expenses. It also means that the services delivered by the HIE must be at a level that healthcare organizations have come to expect from their suppliers.

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		Technology US HHS by Indiana Health Information Exchange			
118	IGI Global (155)	Dictionary: IGI Global, publisher	Unknown	Unknown	Health information exchange (HIE) refers to the process of reliable and interoperable electronic health-related information sharing conducted in a manner that protects the confidentiality, privacy, and security of the information. Essential to this process is the capability to employ recognized standards as they are established incrementally, further enabling interoperability, security and confidentiality of the information as well as authorization of those who access the information.
119	ILHIE (156)	Report: Illinois HIE Strategic & Operational Plan by the Illinois Office of Health Information Technology	2010	US	The creation of a State-level health information exchange system will allow, among other benefits, the widespread utilization of electronic health records by health care providers and patients in order to ensure that Illinois health care providers can achieve the Meaningful Use of electronic records, as defined by federal law, and participate fully in the health information technology incentives available from the federal government under the Medicare and Medicaid programs.”
120	Illinois General Assembly (157)	Webpage: Illinois Health Information Exchange and Technology Act	Unknown	US	The Illinois Health Information Exchange ("ILHIE"), to promote and facilitate the sharing of health information among health care providers within Illinois and in other states. ILHIE shall be an entity operated by the Authority to serve as a State-level electronic medical records exchange providing for the transfer of health information, medical records, and other health data in a secure environment for the benefit of patient care, patient safety, reduction of duplicate medical tests, reduction of administrative costs, and any other benefits deemed appropriate by the Authority.
121	Infor (158)	Web page: Infor Company / Solution provider (IBM Enterprise Master Person Index (EMPI))	Unknown	US	Health information exchange (HIE) initiatives that focus on facilitating the exchange of health information electronically among physicians, hospitals, health plans, and patients.
122	Infor Cloverleaf (15)	Web page: : Infor Company / Solution provider / Products	Unknown	US	Infor Cloverleaf Hosted Healthcare Information Exchange is a secure, standards-based infrastructure that integrates clinical data from across disparate systems and manages the wide variety of clinical records, document types, and content pervasive in today's healthcare community.

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123	iNexx (159)	Web page: Solution provider	Unknown	US	Health information exchange (HIE) is the secure, electronic exchange of health information among authorized stakeholders in the healthcare community – such as care providers, patients, and public health agencies – to drive timely, efficient, high-quality, preventive, and patient-centered care. This exchange of healthcare information improves patient care and reduces costs by fostering care collaboration and lowering administrative encumbrances.
124	Inspira (160)	Web page: Inspira Health Network / service provider	Unknown	US	Health information exchange (HIE) allows the sharing of your health information among participating doctors' offices, hospitals, labs, radiology centers, and other health care providers through secure, electronic means. The purpose is to provide participating caregivers the most recent health information available. This health information may include lab test results, radiology reports, medications, hospitalization summaries, allergies, and other clinical information vital to your care. Certain demographic information used to identify the individual such as name, date of birth, address, insurance may also be shared.
125	(161)(168)(167)(163)Inteli Chart (161)	Web page: Inteli Chart / Solution Provider	Unknown	US	Health Information Exchange is much more than just moving data from one spot to another – it's about making the data meaningful, useful and relevant. InteliChart's approach to HIE solutions focus on the acquisition of data and then aggregating the data into a standardized and structured format.
126	InterSystem (36)	Webpage: ehealthnews.eu / Denmark Selects InterSystems HealthShare for Countrywide Health Information Exchange	2012	Denmark	InterSystems HealthShare is a strategic healthcare informatics platform that enables the sharing of patient information via seamless, bi-directional integration, using active analytics to drive decision-making, and unlocking the unstructured data that is found in patient records
127	IOM (162)	Report: Institute of Medicine , Crossing the quality Chasm	2001	US	Health information exchange (HIE), the exchange of electronic health information across health care clinicians and organizations, has the potential to improve health care quality delivered by the US health care system
128	J. (163)	Scientific	2011	US	Health information exchange—the collection of activities and technologies for sharing data generated from separate sources of clinical information—to manage both individual patients and groupings of people with similar clinical conditions

S.No.	Author	Source	Year of Publication	Country	Definition
129	Joshi (164)	Scientific	2010	US	Health Information Exchanges (HIE) are rapidly advancing as the next step in improving patient care using technological applications. HIE affect the fundamental patient care system by transforming how medical information is delivered and disseminate
130	Johnson and Gadd (165)	Scientific	2007	US	Health information exchange (HIE) systems are large, multimillion dollar efforts that are implemented despite initial institutional apprehension, with largely unanticipated effects on the clinical workflow, and with a primary goal of establishing a reason to sustain the effort.
131	Jones et al (166)	Scientific	2011	US	Health information exchange (HIE), i.e., electronically exchanging key clinical information such as discharge summaries, procedures, problem lists, medication lists, medication allergies, and diagnostic test results with other external healthcare providers is a core requirement of Stage 1 “meaningful use” for hospitals.
132	Kaelber and Bate (167)	Scientific	2007	US	Better patient safety through enhanced, technology enabled, HIE will directly improve patient safety because it will provide a more complete clinical picture of a patient.
133	Karl (168)	Scientific	2012	US	The term "HIE," acronym for health information exchange, is being used interchangeably to define both the organization that is responsible for managing the exchange of the data (the noun) and the process by which the data can be exchanged (the verb).
134	KC (169)	Web page: Kane County Health Department	Unknown	US	The Health Information Exchange (HIE) will allow local public health departments to be able to evaluate real-time health data on a population level, in order to monitor the health of our community, as well as to assure that we provide the highest quality service to our residents. In addition, we will be better able to respond to health issues in our community.
135	Kern and Kaushal (170)	Scientific	2007	US	HIE involves the sharing of health information electronically across health care settings.
136	Kern et al (171)	Scientific	2009	US	Health information exchange involves the electronic sharing of clinical data, including sharing of clinical data across health care providers caring for the same patient.
137	Key Stone (172)	Web page: Key Stone HIE, Provider	Unknown	US	Keystone Health Information Exchange (KeyHIE) streamlines treatment decisions and care coordination with quick access to both in and out-of-network electronic health records (EHRs)-when and where you need them.
138	Kijsanayotin et al.(173)	Scientific	2007	US	In a health information exchange (HIE) project, linking patients' health records across organizations while maintaining appropriate patients anonymity is essential.

S.No.	Author	Source	Year of Publication	Country	Definition
139	KLAS (174)	Web page: Research company	2014	US	Health information exchanges (HIEs) are defined as non-owned hospitals, health systems, ambulatory entities, and/or other third parties that share/exchange patient data and other information.
140	Kongstvedt (175)	Book: Essentials of Managed Health Care, Sixth Edition	2012	US	An entity to facilitate the electronic exchange of health information between physicians, hospitals, laboratories payers and so on, that is sponsored by a state or a federal government.
141	Kralewski et al (176)	Scientific	2012	US	Electronic health information exchange (HIE) among physicians, hospitals, and public health agencies is a fundamental dimension of most proposals for health care reform. It is argued that enabling providers in different settings easy access to a patient's health record would reduce duplication of services and improve treatment decisions.
142	Kuperman (177)	Scientific	2011	US	Health-information exchange, that is, enabling the interoperability of automated health data, can facilitate important improvements in healthcare quality and efficiency.
143	L. Block (178)	Web page: Health Information Technology Knowledge Base	Unknown	US	Health information exchange supports the sharing of health-related information to facilitate coordinated care through the utilization of EHRs. EHRs draw information from many sources through health information exchange. Thus, the process of health information exchange is another piece of the health information technology infrastructure and informatics
144	Lee et al (179)	Scientific	2010	US	The South Carolina Health Information Exchange (SCHIE) provides a state-level information infrastructure for connecting local healthcare providers and other stakeholders. The network enables providers to view clinical data that include medications, diagnoses, and procedures. HIEs provide the infrastructure for information exchange, including the business model, governance structure, operating principles, legal model, and technology model for the exchange of healthcare information among various organizations.
145	Liu (180)	Scientific	2007	US	To provide patient care across the continuum of healthcare delivery sites, care delivery organizations need to consolidate the clinical information from hospitals, clinics, physicians' offices, labs, specialty facilities, and even home

S.No.	Author	Source	Year of Publication	Country	Definition
					healthcare into a single patient record to support the delivery of healthcare services. The ability to exchange and aggregate information from these various systems is essential to improve health, quality, and safety within the US healthcare system.
146	Lloyd-Puryear and Brower (181)	Scientific	2010	US	While several elements are in place to realize a systems approach, the authors think that the key is an integrated, multidirectional health information exchange system that functions locally, regionally and nationally, and enables information exchange between private and public health sectors.
147	LMO (182)	Web page: Liquid Medical Office, Inc. Solution Provider	Unknown	US	Health information exchange (HIE) is a secure electronic exchange of health information among authorized healthcare networks to improve safety, efficiency, and continuity of care. Data exchanged through the HIE is shared safely and securely, meeting or exceeding HIPAA standards.
148	Lobach et al (183)	Scientific	2007	US	Information technology, and in particular a health information exchange (HIE), has the capacity to enhance the management of the health of populations by promoting the sharing of health information across independent healthcare organizations. The information available through HIEs can be used by clinical decision support (CDS) systems to identify sentinel health events and patient-specific care needs, and then to promote proactive interventions.
149	Loonsk (184)	Web page: CGI, Initiative for Collaborative Government	2010	US	HIE” is used to describe: hospitals sharing lab reports and discharge summaries with affiliated providers; multi-stakeholder Regional or State Health Information Organizations (RHIOs, HIEs, HIOs); the exchange of information among the products of a single EMR vendor; the secure emailing of documents; and, perhaps most simply and broadly, the ability of any piece of software to exchange information. HIE can include information being browsed, “pulled” and/or “pushed,” and information that is fully coded with nationally recognized vocabularies or information that is in barely processable document formats.
150	Lori (185)	White paper: What is HIE? A Federal and State Perspective by Object Health, LLC. Women Consulting Group	Unknown	US	The movement of data between health information systems for the purposes of: Patient communication Provider Communication State Communication Health information exchange describes an action: Provider orders a lab test Lab result is delivered to Provider

S.No.	Author	Source	Year of Publication	Country	Definition
					Provider tells the patient the results.
151	Louisiana (186)	Webpage: Louisiana Health Information Exchange	Unknown	US	Known as LaHIE, the exchange allows authorized providers and organizations to electronically access and share health-related information through a secure and confidential network for the purpose of improving patient safety, quality of care and health outcomes.
152	Luo (187)	Scientific	2006	US	Exchange of information is one of the key elements to making EMRs beneficial to patients across the healthcare spectrum, whether at the physician's office, hospital, or pharmacy.
153	Mäenpää et al. (38)	Scientific	2011	Finland / Sweden	The implementation of a technology such as health information exchange (HIE) through an (regional health information systems) RHIS should improve the mobilization of health care information electronically across organizations within a region, by coordinating care and bringing together local stakeholders.
154	Maine (188)	Web page: Maine State HIE	Unknown	US	CMS defines HIE as the secure and interoperable sharing of health information in a manner that protects the confidentiality, privacy, and security of an individual's information.
155	marchcarson100 (189)	Blog: mandmhitech	2011	Unknown	HIE is a group of entities with the capability to move info digitally using nationwide standards. HIE is a Process Health Info Exchange (HIE) refers back to the strategy of enabling the dependable sharing of digital patient care-associated data amongst health care associated entities and networks. This sharing is done in a way that protects the confidentiality, privacy and safety of the information. Central to this concept is the usage of nationally recognized standards currently in place and future ones as they are published. HIEs can even provide key information to people to promote improved health and wellness, and can be used to assist research, public well-being, emergency response, and high quality improvement. Additionally, an HIE allows the sharing of health-related data amongst healthcare organizations and with individuals on a neighborhood, regional, and nationwide basis.
156	Marchibroda (190)	Book: Health Literacy, eHealth, and Communication	2009	US	Health information exchange is another major component of eHealth. This refers to the electronic exchange of data across organizations and disparate information systems, including data from laboratories, pharmacies, plans, physicians, or hospitals

S.No.	Author	Source	Year of Publication	Country	Definition
157	Matthews et al. (191)	White Paper: Indiana and Ohio Health Information Exchanges Connect for Nation's First Live, Multi-Region Clinical Information Exchange	2009	US	Live exchange will allow secure electronic exchange of health information, reduce duplication, improve efficiency, improve patient care and further the nation's goal to interconnect healthcare
158	McIlwain and Lassetter (192)	Scientific	2009	US	A well-designed HIE should enable bi-directional integration between practice and hospital EMRs, as well as interoperability with other physicians' EMRs or outside systems, such as reference labs. Patients should also be able to integrate their medical histories with a personal health record (PHR), such as Google Health or Microsoft's HealthVault.
159	(60)	Webpage: Computer World, News. Verizon creates medical information exchange cloud	2010	US	Verizon Health Information Exchange, consolidates clinical patient data from various providers and translates it into a standardized format that can then be accessed via a secure Web portal.
160	Merrill (16)	Web page: Molly Merrill is the Associate Editor of Healthcare IT News. She covers physician practice IT issues and national breaking news.	2009	US	The Georgia Cancer Coalition, an independent, not-for-profit organization based in Atlanta, will use a state-wide healthcare information exchange to share evidence-based medicine with community cancer care centers. The exchange will serve as a trusted third party in the state to acquire, analyse and report de-identified patient data around quality measures from providers and hospitals that deliver cancer care.
161	Merrill et al (193)	Scientific	2013	US	Electronic HIE for public health reporting (HIE for PH) is a powerful strategy for shaping both short and long term policies to promote the health of populations through: rapid and efficient identification, monitoring, investigation, and treatment of communicable and emerging diseases; early identification of food borne outbreaks and environmental exposures; identification of health risk factors; and planning and evaluation of public health services.
162	Mental Health (194)	Mental Health Information and Primary Care Integration Act of	2011	US	Health information exchange: an electronic system that receives maintains and facilitates the transfer of protected health and mental health information by and between mental health and healthcare providers.

S.No.	Author	Source	Year of Publication	Country	Definition
163	MHIE (195)	2011 Web page: Memorial Hermann Information Exchange for authorized exchange members	Unknown	US	MHiE's (Memorial Hermann Information Exchange) suite of solutions facilitates access to important clinical information to provide safer, efficient and equitable patient-centered care.
164	Michigan (196)	Report: 2007-2008 Report to the Michigan Legislature by the Michigan Health Information Technology Commission	2008	US	Health Information Exchange is a way to electronically move personal health and medical information securely between various health care organizations and providers under current medical privacy and confidentiality standard procedures. The goal of HIE is to facilitate delivery and retrieval of clinical data to provide safe, timely, efficient, effective, and equitable patient-centered care. In short, the goal of HIE is to ensure that providers have the right information about their patient at the right time to provide the best possible care.
165	Minnesota (197)	Web page: Minnesota Department of Health	Unknown	US	Health information exchange, or HIE, in Minnesota means the electronic transmission of health related information between organizations according to nationally recognized standards. This means each time information is sent electronically to another provider it is done in a uniformly accepted way that meets specific standards to ensure protection of the data and privacy of the patient. It also means the information will be received in a way that is usable for the recipient.
166	Minnesota health (198)	Web page: A Practical Guide to Understanding HIE, Assessing Your Readiness and Selecting HIE Options in Minnesota by Minnesota Department of Health	Unknown	US	HIE refers to the secure electronic sending and receiving of clinical health information in ways that the information can be understood by both the sender and the receiver of the information.
167	Mobile MD (199)	Web page: Siemens HIE Solution	2011	US	MobileMD® is a vendor-neutral, fully outsourced health information exchange (HIE) for health systems, hospitals, physicians, labs and ancillary healthcare providers. It offers secure messaging, analytic solutions, an EMR to physician practices, and connects healthcare providers and patients through secure clinical and patient portals. Together, the HIE enriches care teams with information as patients move through the healthcare system.
168	Mobile MD (200)	Web page: Siemens HIE Solution	Unknown	US	MobileMD®, a Siemens solution, is a four-dimensional health information exchange – care, service, economics, and technology – providing physicians

S.No.	Author	Source	Year of Publication	Country	Definition
					with near real-time, secure, clinical and administrative information regardless of location, affiliation, EMR technology, or vendor.
169	Moore (201)	Blog / Report	2011	US	A Health Information Exchange (HIE) is a technology network infrastructure whose primary purpose is to insure the secure, digital exchange of clinical information among all stakeholders that are engaged in the care of a patient to promote collaborative care models that improve the quality and value of care provided.
170	Moore et al. (202)	Scientific	2012	US	A health information exchange (HIE) can provide automatic notifications to its members by building services on top of their existing infrastructure.
171	Morgan Hunter (203)	Blog: Company, Morgan Hunter Healthcare Inc.	Unknown	Unknown	HIE refers to any ongoing exchange of electronic clinical information between organizations such as hospitals, physician offices, clinics, clinical research groups, public health entities and quality assurance groups. It also includes the ongoing exchange between care provider organizations and consumers' personal health records (PHRs).
172	Morrissey (204)	Magazine	2013	US	Health information exchange — that set of activities concerned with getting clinical documentation from the places where it was created to other places that could really use the information — lacked some basic components: a critical mass of computer systems to create discrete data; standards allowing data from one electronic health record to be taken in by another; and routine methods to transmit the data anywhere it needed to go.
173	Mosbys (205)	Mosbys Medical Dictionary	2009	US	A nursing intervention from the Nursing Interventions Classification (NIC) defined as providing patient care information to other health professionals
174	Mount Sinai (206)	Web page: Mount Sinai HIE, Mount Sinai Hospital	Unknown	US	Health Information Exchange is the sharing of health information electronically between providers. This exchange can be done directly between two providers that care for the same patient or can be enabled through a technology that provides the electronic information to a provider. Information can only be shared between providers if a relationship exists with a patient or the patient explicitly gives their approval to access their information.
175	MSV (207)	Web page: Medical Society of Virginia	Unknown	US	Virginia's health information exchange (HIE) aims to help connect providers and patients. A HIE provides authorized users with access to patients' health-related information that is typically stored in multiple organizations, while maintaining the integrity of the information being exchanged. It may be a community-based, regional, statewide or larger exchange that facilitates the electronic exchange of information between providers. These resources will help you understand the state's framework for health information exchange and how it will facilitate improvements in care coordination and information

S.No.	Author	Source	Year of Publication	Country	Definition
					sharing.
176	MTBC (208)	White Paper: What is Health Information Exchange (HIE) by MTBC, healthcare IT company	Unknown	US	Health Information Exchanges (HIE) are organizations that synergize and effectively streamline health information records. Many state governments provide funding for HIE implementation with the goal of facilitating access to and retrieval of clinical data to provide more timely, focused, and equitable patient-centered care.
177	Munoz et al. (209)	Scientific	2013	US	HIEs are electronic networks into which health providers can connect to have access to all medical records for an individual within a particular community
178	Murphy a (210)	Web page: ehrintelligence.com for latest technology news and white papers / Article	2012	US	Exchange of electronic information between providers and across platforms that is secure and safeguards patient privacy. HIE is closely aligned with interoperability so that information can flow back and forth between doctors, patients, and health networks.
179	Murphy b (211)	Web page: ehrintelligence.com for latest technology news and white papers / Article	2012	US	An HIE bridges the knowledge gap between providers, allowing them to trace the treatment of patients by various providers and act upon this information in a meaningful way. But on a higher level, an HIE could prove invaluable for an entire population.
180	Myers et al.(212)	Scientific	2012	US	Health information exchanges (HIE) that facilitate the exchange of health information across clinical and non-clinical settings can support teams of providers – physicians, health educators, social workers, and pharmacists – caring for patients with HIV (213) by expanding access to patient information.
181	NAHIT (214)	Report to the Office of the National Coordinator for Health Information Technology on defining key health information technology terms	2008	US	Health information exchange is another form of HIT, which enables electronic movement of health-related information among organizations.
182	NAHP (215)	Report: EHR by National Association for Health Professionals	2011	US	Health information exchange (HIE) has emerged as a core capability for hospitals and physicians to achieve "meaningful use" and receive stimulus funding. Healthcare vendors are pushing HIE as a way to allow EHR systems to pull disparate data and function on a more interoperable level.
183	Nakamura et al (216)	Scientific	2010	US	Hospitals' involvement in HIE, defined as active exchange of electronic data by a hospital outside its system.
184	NaviNet (217)	Blog: The Medical Quak, post: NaviNet	Unknown	Unknown	NaviNet helps doctors' offices instantly access patients' insurance information, such as their benefits eligibility and claims status, over the Web.

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		HealthCare Communication Network – Transactional Portal Information Exchange			
185	NCHICA (54)	Report: Prepared by the NCHICA Consumer Advisory Council on Health Information (CACHI) for The North Carolina Health Information Technology Strategic Planning Task Force	2009	US	The standardized electronic exchange of health records (typically EHRs) between healthcare providers to enable continuity of care.
186	NC HIE (218)	Web page: North Carolina Health Information Exchange	Unknown	US	NC HIE operates North Carolina's statewide health information exchange, a secure, standardized electronic system in which providers can share important patient health information. The use of this system promotes the access, exchange, and analysis of health information. NC HIE enables participating organizations to: Save time and reduce paperwork Facilitate more informed treatment decision-making Leads to improved care coordination, higher quality of care, and better health outcomes.
187	NDHIN (219)	Web page: North Dakota Health Information Network	Unknown	US	Health information exchange that utilizes information infrastructure and systems in a secure and cost-effective manner to facilitate the collection, storage, and transmission of health information.
188	NRC (220)	Book: Networking Health: Prescriptions for the Internet	2000	US	Health information exchange (HIE) makes previously inaccessible data available, resulting in the availability of more complete clinical information, which could improve the quality of care.
189	NV HIE (221)	Web page: Nevada HIE	Unknown	US	The chief purpose of the NV-HIE is to provide oversight and governance of the statewide system for the authorized and secure electronic exchange of health information and to establish and maintain a sustainable governance and business structure which achieves broad-based public-private stakeholder

S.No.	Author	Source	Year of Publication	Country	Definition
					collaboration with transparency and accountability while protecting the public interest
190	OCI (222)	Report: Building a Health Information Exchange for the State of Missouri by Object Computing, Inc.	2009	US	A Health Information Exchange (HIE) enables sharing of electronic health-related information among health care providers, patients, and public health agencies.
191	(69)(76)(78)(73) One Partner HIE (69)	Web page: One Partner HIE	Unknown	US	A health information exchange (HIE) is the electronic mobilization of health information across healthcare organizations within a region, across the nation, and globally. Basically, it's the "one-to-many" or the "many-to-many" delivery of health information to improve care, making care more patient-centric. The foremost goal of an HIE is to make possible the access and retrieval of clinical data so care may be delivered in a safer and more timely manner. Fostering improved patient care by encouraging involvement of multiple clinicians from across the patient care spectrum, continuity of care is greatly improved.
192	Onyile et al. (12)	Scientific	2011	US	The New York Clinical Information Exchange (NYCLIX), a functioning health information exchange, is used by emergency department (ED) personnel to obtain prior health data.
193	Onyile et al.(13)	Scientific	2013	US	The New York Clinical Information Exchange (NYCLIX) was a Manhattan-based RHIO, which built an operational, secure HIE available to authorized hospitals and other healthcare providers in the NYC metropolitan area. NYCLIX was a collaboration among ambulatory physician groups, long-term care facilities, a Medicaid managed care plan, the nation's largest home healthcare provider and academic medical centers.
194	Open Source (223)	Web page: Hartford Hospital: Open Source HIE. Open Source Community for Healthcare.		US	Health Information Exchange (HIE) that will link the acute care hospitals with the ambulatory and tertiary care facilities along with the labs and diagnostic centres in the region.
195	OPTUM (224)	Web page: Company / Solution Provider	Unknown	US	HIE provides the capability to electronically move clinical information among disparate health care information systems while maintaining the meaning of the information being exchanged. An HIE is a foundational piece of the Accountable Care Organizations (ACO) because it provides a way for EMRs

S.No.	Author	Source	Year of Publication	Country	Definition
196	Oracle (225)	White paper Oracle Health Information Exchange: Secure, Seamless Data Sharing	2012	US	to exchange information across different types of medical records. Health information exchange (HIE)—the seamless, secure, electronic sharing of health data across networks.
197	Orion HIE (226)	Web page: Orion Health, Solution Provider	Unknown	US	Orion Health™ Health Information Exchange (HIE) is a powerful health information backbone that enables organizations and clinical communities to exchange medical information and share complete patient records. Whether a hospital or health system, a public or regional HIE, Orion Health gets your organization connected. Orion Health HIE enables the exchange of any clinical information between organizations, ensuring that all clinical staff have access to relevant, up-to-date and accurate patient information regardless of where care is provided or the clinician is located.
198	Overhage et al (227)	Scientific	2005	US	Health information exchange, defined as the electronic sharing of health information across health care organizations within a region, community, or hospital system, is advocated as essential to improving health care quality and reducing costs
199	Overhage et al (228)	Scientific	2007	US	The country has identified health information exchange (HIE) as an essential strategy to address our crisis of cost, quality, and safety in health care. (HIE) networks that are, in turn, a collection of interconnected, interoperable health information systems (HIS).
200	Ozkaynak and Brennan (229)	Scientific	2013	US	Health information exchange (HIE) allows clinicians to access patient level health care information.
201	PAeHealth (230)	Electronic Article: What is the Difference between HIX and HIE? By PA eHealth Partnership Authority	Unknown	US	HIE stands for health information exchange. HIE plays an important role in giving the healthcare system a 21st century upgrade. It gives providers—doctors, nurses, hospitals, pharmacies, laboratories and others—the ability to exchange health information electronically with other providers in a secure environment
202	Palmetto (231)	Web page: Palmetto Health: Healthcare, non-profit healthcare resource	Unknown	US	A Health Information Exchange (HIE) is a convenient electronic service that allows healthcare providers at multiple sites to have access to a patient's EMR. Palmetto Health recently launched Provider HIE, which includes Palmetto Health hospitals and physician practices. There is no cost to you to allow your EMR to be accessible through the HIE.
203	Payne et al. (10)	Scientific	2011	UK	Clinical information exchange in the UK was accomplished by establishing a foundation of policy, infrastructure, and systems of care, by creating and acquiring clinical computing applications, and with strong use of financial and

S.No.	Author	Source	Year of Publication	Country	Definition
					clinical incentives.
204	PCMAG (66)	Web page: pcmag.com for tech news, buying guides, reviews etc.	Unknown	US	Health Information Exchange, a service that enables exchange of healthcare information between hospitals and regions. The information is not only used to provide medical data for people who move to a different geographic area, but also to provide statistics for public health in general. There are many regional health information organizations (RHIOs) throughout the U.S. that are involved in health information exchange (HIE), and the terms RHIO and HIE are used synonymously.
205	PDN (232)	Web page: Professional Dynamics Network Inc.	2011/12	US	HIE (Health Information Exchange) refers to the technological network infrastructure, that has the chief purpose of assuring accurate medical information exchange. This patient data and electronic health records (EHR), which is digital information and secure, is clinical information used in between medical organizations who are responsible for providing healthcare to the patients. A Health Information Exchange provides a technology platform that promotes collaborative care models that are crucial to improve the value and quality of the healthcare provided.
206	PDN (233)	Web page: Professional Development Network, Inc.	Unknown	US	Health information exchange system is responsible for mobilizing the healthcare information electronically throughout the associated organizations that are bordered by community, hospital system and region. Health information exchange can endow us the ability to transfer clinical information electronically in between the network of health care (233) information systems and at the same time maintaining and securing the true meaning of the information being exchanged. It is the job of health information exchange system to provide the access to and retrieval of the medical data in order to facilitate effective, patient-centered, timely, safe, secured and equitable health care. The health information exchange system is also fruitful in terms of providing assistance to the Public Health authorities in the analyses of the countrywide population health.
207	Pennsylvania (234)	Report: Pennsylvania eHealth Collaborative Strategic Plan for Health Information Exchange 2012	2012	US	Health Information Exchanges (HIEs) are entities often built on a series of often bilateral legal agreements between different, often proprietary information systems to be able to share certain kinds of data. The electronic movement of health-related information among unaffiliated organizations according to nationally recognized standards. HIE provides the opportunity to improve quality and safety of care, improve efficiency, reduce costs and make care more convenient for
208	Princeton (235)	Web page: Princeton	Unknown	US	Princeton HealthCare System's Health Information Exchange (HIE) called

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		Healthcare System			Princeton HealthConnect® uses health care technology allows hospitals, doctors and other health care providers to electronically share health information with each other in a secure, timely manner. This health information could include reports about your illnesses, injuries, allergies, medicines and test results.
209	Privacy Rights (236)	Web page: California Medical Privacy Fact Sheet C2: How Is Your Medical Information Used and Disclosed - With and Without by Privacy Rights Clearing House	2012	US	HIE will make your records electronically accessible to all permissible health care personnel, wherever those records may be.
210	Prism (237)	Web page: Prism Health Services, Consulting Company	Unknown	US	An HIE enables the exchange of health-related data among health providers, public health agencies, payers, and patients. Again, the core purpose is for improving the quality and efficiency of healthcare delivery and, ultimately, the improvement of population health. Building trust and consensus among stakeholders is key to ensuring the success of an HIE.
211	RCHN (65)	Web page: RCHN Community Health Foundation (RCHN CHF) is a not-for-profit operating foundation	Unknown	US	Sometimes the term HIE is used as part of the name of a Regional Health Information Organization, or RHIO, defined in the same report as, “a health information organization that brings together health care stakeholders within a defined geographic area and governs health information exchange among them for the purpose of improving health care in that community.” Here “HIE” mean the process of sharing information and “RHIO” mean the organization that facilitates the sharing.
212	Rebryna (34)	Scientific	2009	Canada	Regional health information organizations (RHIOs) or health information exchanges (HIEs) vary in definition, but the overall concept rests on the exchange of health information across organizations.
213	Recogniti (238)	Web page: Recogniti, Solution provider	Unknown	US	Health Information Exchange allows health care professionals and patients to appropriately access and securely shares a patient’s vital medical information electronically. There are many health care delivery scenarios driving the technology behind the different forms of health information exchange available today. Health Information Exchange (HIE) is one of the most common forms of utilizing an EHR solution.
214	Reeder (239)	Web page / Post: Vendor, EHRDoctors	2011-2012	US	When asked for a definition of HIE, the answers we get back range from: paperless, email, provider portals, and electronic summary of care records.

S.No.	Author	Source	Year of Publication	Country	Definition
215	Reeder et al (240)	Scientific	2012	US	A Health Information Exchange (HIE) provides a secure, interoperable infrastructure for electronically moving clinical data between heterogeneous health information systems and its stakeholders, including public health.
216	Regan (8)	Scientific	1991	Australia	Electronic Data Interchange (EDI) promises to speed the transfer of medical data, insurance information and payments.
217	Revere and Stevens (241)	Scientific	2010	US	HIEs have developed real-time, nationwide public health event-monitoring capability to assist with and improve early event detection, public health situational awareness, outbreak management, and countermeasure and response administration.
218	Rhode Island (242)	Web page: State of Rhode Island, Department of Health	Unknown	US	Rhode Island's health information exchange system is an electronic network that gives medical professionals access to their patient's health information. It will help healthcare providers give their patients the best possible care by giving healthcare providers access to their patient's health information, including information that comes from other providers. Health care consumers can choose to participate in current care and can control who can access their health information.
219	RIQI (243)	Web page: Current Care Rhode Island HIE, Rhode Island Quality Institute	Unknown	US	CurrentCare, Rhode Island's the Statewide Health Information Exchange (HIE), is a secure electronic system which will allow doctors and other care givers immediate access to a patient's up-to-date health information in order to provide the best possible and most comprehensive care.
220	Ross et al.(244)	Scientific	2010	US	COMMUNITY-HIE: Currently engaged in community-wide HIE, defined as a system that consolidates and provides more than one category of information (e.g., laboratory test results, radiographic results, clinical notes) from more than one independent organization. COMMUNITY-HIE practices could use either paper or electronic medical records.
221	Rouztan (245)	Web page / Blog: Central Illinois Health Information Exchange Blog	2013	US	What an HIE does is allow a healthcare provider to log into a secured website and pull up all of the medical information about you from all of your medical caregivers (as long as they are participating in sharing data with the HIE) in one place. This is similar to searching a site like Expedia for travel options. It goes out and pulls all the information into one screen for you.
222	Rowley (246)	Post: Healthcare Technology Consultant	2013	US	Health Information Exchanges (HIEs) are defined in HITECH, and are envisioned as hubs where different systems can exchange health data (assuming they have cracked the patient-identity nut) and break down the silos of EHR data.
223	RSA Index (247)	Web page: New Hampshire Revised	1989	US	"Health information exchange" means an entity established for the primary purpose of enabling and overseeing the exchange of protected health

S.No.	Author	Source	Year of Publication	Country	Definition
		Statutes Annotated (RSA) Index			information for clinical decision-making purposes. The entity may operate on a regional, statewide, or multi-state basis. The entity may be developed by multiple stakeholders, including, but not limited to, the department of health and human services, a non-profit entity, or a for-profit entity.
224	SafeNet (18)	Security Guide: What You Need to Know About Securing Healthcare Information Exchanges by , SafeNet, a global leader in information security	2010	US	Healthcare Information Exchanges (HIE) provide the capability to electronically move clinical information among different healthcare organization like hospitals, physician offices, pharmacies, and health insurance companies. HIEs are quickly emerging since they facilitate access to clinical data allowing healthcare professionals a more efficient and simple way to access patient data
225	San Diego (17)	Web page: San Diego Regional HIE	Unknown	US	The San Diego Regional Healthcare Information Exchange (San Diego Beacon) is a collaborative of local hospital systems, community clinics, emergency medical services and public health organizations whose goal is to deliver the highest quality health care to all San Diegans.
226	SCA (248)	White Paper: Healthcare Identity Management: The Foundation for a Secure and Trusted National Health Information Network. Smart Card Alliance Position Paper for Government Policy Makers and Healthcare Stakeholders	2009	US	An HIE provides the capability to securely and confidentially enable electronic transfer of clinical information among separate healthcare information systems, while maintaining the meaning of the information being exchanged.
227	Schulte (249)	Book: Healthcare Delivery in the U.S.A.: An Introduction	2012	US	HIE refers to the technology and process infrastructure that supports the sharing of clinical and other patient data within a geographic region and among the organizationally unrelated providers of care in that region.
228	SEMHIE (250)	Web page: Southeast Michigan Health Information Exchange (SEMHIE)	Unknown	US	The Southeast Michigan Health Information Exchange (SEMHIE) is a multi-stakeholder initiative dedicated to delivering the promise of integrated health information exchange throughout Southeast Michigan. When successfully deployed, SEMHIE will: Enhance patient care, quality and safety Increase effectiveness and efficiency of healthcare delivery Reduce healthcare costs.

S.No.	Author	Source	Year of Publication	Country	Definition
229	Shade et al (251)	Scientific	2012	US	Health information exchange (HIE) is the process of electronic multi-directional transfer of identifiable, patient-level information between different organizations.
230	Shapiro et al.(252)	Scientific	2007	US	Health information exchange (HIE) is a potentially powerful technology that can improve the quality of care delivered in emergency departments.
231	Shapiro (253)	Scientific	2007	US	They (HIE) aim to bring previously unavailable clinical data from patients' disparate health records, which may be spread over multiple provider and payer networks, to the point of care where clinicians and their patients need it most.
232	Shapiro et al (254)	Scientific	2010	US	Health information exchange, which enables the flow of electronic data among disparate providers and electronic health records
233	Shapiro et al (255)	Scientific	2013	US	The NYCLIX HIE provided the technical, organizational, and policy infrastructure to support electronic data exchange across member sites.
234	Sicotte and Paré (256)	Scientific	2010	Canada	Interest in health information exchange (HIE), defined as the use of information technology to support the electronic transfer of clinical information across health care organizations, and continues to grow among those pursuing greater patient safety and health care accessibility and efficiency.
235	Sittig and Joe (257)	Scientific	2010	US	The local and regional Health Information Exchanges (HIEs) should provide the technical, financial, privacy oversight and governance of all aspects of an electronic portal through which individual patients' health data can be transferred between and among authorized users, in accordance with agreed-upon information exchange policies and standards, and subject to strict privacy and security protections. Users of an HIE can include patients, providers, public health officials, payers, and researchers.
236	Smith (258)	Web page / Post	2012	US	Health Information Exchange (HIE) is both a verb and a noun; it is the transmission of clinical or claims information from one party to another, and may occur without the presence of a data warehouse or centralized registry, typically known as a HIE.
237	Steward et al (259)	Scientific	2012	US	Health information exchanges (HIEs) require a synthesis of goals, protocols, data formats, and infrastructure within and across organizations.
238	STHL (260)	Web page: Southern Tier HealthLink (STHL), a non-profit RHIO	Unknown	US	A health information exchange (HIE) is technology that allows healthcare information to pass electronically across organizations within a particular region or community. Clear and strict state and federal guidelines govern how the information can be exchanged, viewed, and used. The goal of the HIE is to make the information available when and where it is needed.

S.No.	Author	Source	Year of Publication	Country	Definition
239	Stoten (67)	Scientific	2009	US	The Indiana Health Information Exchange (IHIE), known throughout the United States as being in the forefront of the Regional Health Information Organizations (RHIO) initiative, allows physicians to access information directly from their website or through a hospital portal. IHIE provides results such as dictation, lab, and radiology results and information is delivered to the physicians through direct connections with an EHR
240	SuccessEHS (261)	Web page: SuccessEHS Solution Provider	Unknown	US	HIE is both a verb and a noun. HIE as a noun: A health information exchange (HIE) refers to an exchange network or an organization that operates a network that connects the electronic health information systems of different health care providers. HIEs enable those providers to share clinical and demographic data of patients they have in common. For instance, a primary care physician may share a patient's data with that patient's cardiologist. HIE as a verb: Health information exchange is the actual transmission of health information. There are multiple types of HIE, including Direct, XDS, Exchange and custom HL7.
241	Suenaga (262)	Web page: About the State HIE, Hawaii Health Information Exchange	2012	US	The State Health Information Exchange is a secure electronic network that enables Hawaii health care providers – such as physicians, pharmacies, labs and other medical providers – to exchange select patient medical information.
242	Tang and Lee (263)	Scientific	2009	US	Health information exchange (HIE), a process that has been referred to as 'tethering' or 'interconnecting'
243	Texas HIE (264)	Web page: Texas HIE		US	Electronic health information exchange, or HIE, is the secure electronic movement of health information among treating physicians and other healthcare providers and related organizations according to national and state laws and nationally recognized standards.
244	THHSC (265)	Web page: Texas Health and Human Service Commission	Unknown	US	The creation of a statewide health information exchange will allow health information to be securely exchanged between providers within Texas. This will increase the coordination and quality of care while improving efficiency in the health care system and increasing consumer empowerment and control.
245	Thomas (266)	Web page / Post: Open HIE Wiki	2013	Unknown	A Health Information Exchange (HIE) makes the sharing of health data across information systems possible. Like a universal translator, an HIE normalizes data and secures the transmission of health information throughout databases, between facilities, and across regions or countries
246	Tripathi et al (267)	Scientific	2009	US	Health information technology (IT) and health information exchange (HIE) are increasingly viewed as key steps in improving the quality, safety, and

S.No.	Author	Source	Year of Publication	Country	Definition
247	Unertl et al.(268)	Scientific	2012	US	efficiency problems that plague U.S. health care delivery
248	Utah (21)	Report: Utah Statewide Clinical Health Information Exchange 2011, Annual Legislative Report by The Utah Legislative Health and Human Services Interim Committee	2011	US	Health information exchanges (HIE) support automated sharing of health data across organizational boundaries. The goal of the Utah cHIE initiative is to create a secure electronic clinical health information exchange (cHIE) network whereby a Utah health care provider can, with patient permission, access basic medical information about their patients no matter where the patient receives care in Utah. Health care providers are not required to participate but may choose the option to participate in the cHIE.
249	Utah State (22)	Report: Utah Clinical Health Information Exchange, Government to Business, State of Utah	2011	US	The Clinical Health Information Exchange (cHIE) provides physicians a way to share and view patient information in a secure electronic manner. This information is accessible, with patient consent, to authorized users while maintaining the highest standards of patient privacy. The goal of the cHIE is to improve the quality of care you receive by increasing efficiency and maintaining patient safety. This is accomplished by enabling healthcare professionals to be better informed, and by reducing time and expense associated with missing information and ordering of duplicate tests.
250	UW Health (269)	White paper: The University of Wisconsin-Madison, school of medicine and public health	Unknown	US	Electronic health information exchange is a service for patients who may receive care at more than one health care organization using electronic health record software.
251	Vaidya et al. (270)	Scientific	2012	US	HIE, which enables the exchange of clinical information among multiple stakeholders, offers hope for improving the quality of care delivered by registered nurses (RN)s working in home healthcare.
252	Vanguard Systems (271)	Webpage: Vanguard Systems, Solution Provider	Unknown	US	Convergent's OmniMD health information exchange (HIE) is meant to transmit healthcare-related data among facilities, health information organizations (HIO) and government agencies according to national standards
253	Vest (272)	Scientific	2009	US	Health information exchange (HIE) makes previously inaccessible data available to clinicians, resulting in more complete information.

S.No.	Author	Source	Year of Publication	Country	Definition
254	Vest and Jasperson (273)	Scientific	2012	US	Health information exchange (HIE) is an avenue to improving patient care and an important priority under the Meaningful Use requirements.
255	Vest (274)	Scientific	2012	US	Health information exchange (HIE), the process of electronically moving patient-level information between different organizations, is viewed as a solution to the fragmentation of data in health care.
256	Vest et al. (275)	Scientific	2013	US	Health information exchange (HIE) is a promising approach to improving the cost and quality of healthcare
257	Virginia (276)	Web page: ConnectVirginia HIE, Inc. is the Statewide Health Information Exchange (HIE) for the Commonwealth of Virginia	Unknown	US	ConnectVirginia provides a secure, confidential electronic system to support the exchange of patient medical records among participating health care providers in Virginia and beyond.
258	VITL (277)	Web page: VITL Solution Provider	Unknown	US	A health information exchange (HIE) is a secure computer network that connects the electronic health information systems of different health care providers, enabling those providers to share clinical and demographic data of patients they have in common.
259	Voigt and Torzewski (278)	Scientific	2011	US	Health information exchange (HIE) has long been touted as a silver bullet, streamlining patient transfers, reducing duplication, enlightening population health, and generally improving health outcomes. It promises to connect clinicians, empower patients, feed data repositories, and trigger decision support alerts from a community-wide set of patient records, among other things. Critical to these solutions is an HIE network that is broadly adopted within a patient community and a rich flow of discrete clinical information.
260	Vreeman (279)	Scientific	2007	US	A comprehensive health information exchange must coalesce all of the various sources that produce health data in order to provide clinicians with information when and where they need it.
261	Walker et al.(280)	Scientific	2005	US	Many providers and policy makers now recognize that the sharing of data among hospitals, doctors, and other health care organizations in a given city, state, or region often referred to as health information exchange (HIE) can make health care safer, more efficient, and more effective.
262	Warholak et al (281)	Scientific	2011	US	HIE was defined as a computer-based system that mobilizes health care information electronically across organizations within a region.
263	Whittenburg (282)	Scientific	2008	US	Health information exchange using an online metadata registry allows nurses, health professionals, hospital administrators, and diverse information systems

S.No.	Author	Source	Year of Publication	Country	Definition
					to make significant strides towards improving health outcomes and human quality of care
264	Wikipedia (283)	Webpage: article on HIE	Unknown	Unknown	Health information exchange (HIE) is the mobilization of healthcare information electronically across organizations within a region, community or hospital system. HIE provides the capability to electronically move clinical information among disparate health care information systems while maintaining the meaning of the information being exchanged. The goal of HIE is to facilitate access to and retrieval of clinical data to provide safer and more timely, efficient, effective, and equitable patient-centered care. HIE is also useful to public health authorities to assist in analyses of the health of the population.
265	Williams et al. (284)	Scientific	2012	US	The goal of health information exchange is for information to follow patients, wherever and whenever they seek care, in a private and secure manner so that teams of doctors, nurses, and care managers can provide coordinated, effective, and efficient care.
266	WPF (285)	Web page: HIE in California. World Privacy Forum, public interest research group.	Unknown	US	A Health Information Exchange, or HIE, is technology that enables the electronic movement of health-related information among health care providers and others. HIEs are an increasingly popular way for hospitals, pharmacies, labs, and emergency room physicians to share patient information. Some HIEs just share information within one hospital network, some share information across many hospitals or physicians in a region, and some HIEs share information across the state.
267	Wright et al (286)	Scientific	2010	US	HIE is the ability for clinicians to share a core set of clinical patient data across practices and entities
268	Xerox HIE (287)	Web page: Xerox healthcare IT solution	Unknown	US	Focusing on preventive and outcomes-based medicine, the HIE solution makes comprehensive patient health information available, even at the point of care. This exchange of information helps reduce medical errors and redundant medical procedures as well as improves patient safety and well-being.